CLAIMS

What is claimed is:

1. A thermoelectric apparatus, comprising:

a first electrode;

a dielectric material proximate said first electrode;

a second electrode opposing said first electrode with said dielectric material deposed therebetween; and

at least one nano-wire extending between said first electrode and said second electrode.

2. The apparatus of claim 1, wherein said at least one nano-wire comprises a bismuth containing material.

3. The apparatus of claim 1, wherein said dielectric material comprises a porous dielectric material.

4. The apparatus of claim 3, wherein said porous dielectric material comprises porous alumina.

5. The apparatus of claim 1, further comprising a negatively charged trace electrically connected to said first electrode and a positively charged trace to said second electrode.

6. A thermoelectric package, comprising:

a microelectronic die having at least one area of which is of a higher heat dissipation rate than the remainder of the microelectronic die when in operation;

a first electrode proximate said microelectronic die including said higher heat area;

a dielectric material proximate said first electrode;

a second electrode opposing said first electrode with said dielectric material disposed therebetween; and

a plurality of nano-wires extending between said first electrode and said second electrode.

7. The package of claim 6, wherein said nano-wires are dispersed in a higher density proximate said at least one higher heat dissipation rate area.

8. The package of claim 6, wherein said at least one nano-wire comprises a bismuth containing material.

9. The package of claim 6, wherein said dielectric material comprises a porous dielectric material.

10. The package of claim 9, wherein said porous dielectric material comprises porous alumina.

11. The package of claim 6, further comprising a negatively charged trace electrically connected to said first electrode and a positively charged trace to said second electrode.

12. A method comprising:

providing a first electrode;

disposing a dielectric material proximate said first electrode;

forming at least one nano-scale opening through the dielectric material;

disposing a conductive material within said at least one nano-scale opening to form at least one nano-wire which contacts said first electrode; and

forming a second electrode opposing said first electrode with said dielectric material deposed therebetween, wherein said second electrode contacts said at least one nano-wire.

13. The method of claim 12, wherein disposing said conductive material comprising disposing a bismuth containing material.

14. The method of claim 12, wherein disposing said dielectric material comprises disposing a porous dielectric material.

15. The method of claim 14, wherein disposing said porous dielectric material comprises disposing porous alumina.

16. The method of claim 12, further comprising forming a negatively charged trace electrically connected to said first electrode and forming a positively charged trace to said second electrode.

17. A method comprising:

providing a first electrode;

disposing a porous dielectric material proximate said first electrode;

disposing a conductive material on said porous dielectric material, wherein said conductive material extends through at least one opening in said porous material to form at least one nano-wire which contacts said first electrode; and

forming a second electrode opposing said first electrode with said dielectric material deposed therebetween, wherein said second electrode contacts said at least one nano-wire.

18. The method of claim 17, wherein disposing said conductive material on said porous dielectric material comprises disposing a bismuth containing material on said porous dielectric material.

19. The method of claim 19, wherein disposing said porous dielectric material comprises disposing porous alumina.

20. The method of claim 17, further comprising forming a negatively charged trace electrically connected to said first electrode and forming a positively charged trace to said second electrode.

21. An electronic system, comprising:

an external substrate within a housing; and

at least one microelectronic device package attached to said external substrate, having at least thermoelectric device including:

a first electrode;

a dielectric material proximate said first electrode;

a second electrode opposing said first electrode with said dielectric material deposed therebetween; and

at least one nano-wire extending between said first electrode and said second electrode;

an input device interfaced with said external substrate; and

a display device interfaced with said external substrate.

22. The system of claim 21, wherein said at least one nano-wire comprises a bismuth containing material.

23. The system of claim 21, wherein said dielectric material comprises a porous dielectric material.

24. The system of claim 23, wherein said porous dielectric material comprises porous alumina.

25. The system of claim 21, wherein said thermoelectric device further comprises a negatively charged trace electrically connected to said first electrode and a positively charged trace to said second electrode.